

## PATENT COOPERATION TREATY

PCT

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY


(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 23 JAN 2006

WIPO

PCT

Applicant's or agent's file reference 63845	<b>FOR FURTHER ACTION</b>		See Form PCT/IPEA/416
International application No. PCT/US2004/043355	International filing date (day/month/year) 24.12.2004	Priority date (day/month/year) 24.12.2003	
International Patent Classification (IPC) or national classification and IPC C08L101/00, C08K5/3435, C08K5/34, C08L23/10			
Applicant DOW GLOBAL TECHNOLOGIES INC et al.			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 12 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input type="checkbox"/> sent to the applicant and to the International Bureau) a total of sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input checked="" type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input checked="" type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand  22.07.2005		Date of completion of this report  24.01.2006	
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized Officer  Bergmans, K  Telephone No. +31 70 340-	



**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/US2004/043355

---

**Box No. I Basis of the report**

---

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements**\* of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

**Description, Pages**

1-26 as originally filed

**Claims, Numbers**

1-35 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/US2004/043355

---

**Box No. IV Lack of unity of invention**

---

1. ☒ In response to the invitation to restrict or pay additional fees, the applicant has:
- ☐ restricted the claims.
  - ☐ paid additional fees.
  - ☐ paid additional fees under protest.
  - ☒ neither restricted nor paid additional fees.
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is
- ☐ complied with.
  - ☒ not complied with for the following reasons:  
**see separate sheet**
4. Consequently, this report has been established in respect of the following parts of the international application:
- ☐ all parts.
  - ☒ the parts relating to claims Nos. 1-13,28,29,32,33 .

---

**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

---

1. Statement

Novelty (N)	Yes: Claims	
	No: Claims	1-13,28,29,32,33
Inventive step (IS)	Yes: Claims	
	No: Claims	1-13,28,29,32,33
Industrial applicability (IA)	Yes: Claims	1-13,28,29,32,33
	No: Claims	

2. Citations and explanations (Rule 70.7):

**see separate sheet**

---

**Box No. VII Certain defects in the international application**

---

The following defects in the form or contents of the international application have been noted:

**see separate sheet**

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/US2004/043355

---

**Box No. VIII Certain observations on the international application**

---

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

**Re Item IV**

**Lack of unity of invention**

The examiner found that the application lacks unity within the meaning of Rule 13.1 PCT.

The common concept between claim 1 and the rest of the independent claims is a rheology-modifiable polymeric composition comprising a free radical polymer and free radical trapping species.

Document D1 (EP1264857) discloses a curable polymeric composition comprising a free radical polymer and free radical trapping species. The composition is used in foam applications.

All the technical features of the common concept as indicated above are known from document D1. Therefore, the application lacks unity of invention within the meaning of Rule 13(1) PCT. The especial technical features according to rule 13 (2) PCT which provide a contribution over the prior art are not so linked to form a unitary inventive concept.

Claim 1 defines a rheology-modifiable polymeric composition comprising a free-radical degradable polymer, a free-radical inducing species and a free-radical trapping species having at least two trapping sites. The free-radical trapping species suppresses degradation of the polymer, and are graftable onto the polymer. Claim 13 defines a rheology-modifiable polymeric composition comprising a free-radical degradable polymer (using shear, radiation or heat), and a free-radical trapping species having at least two trapping sites. The free-radical trapping species suppresses degradation of the polymer, and are graftable onto the polymer. Claim 14 defines a rheology-modifiable polymeric composition comprising a free-radical degradable polymer, a free-radical inducing species and a free-radical trapping species. The free-radical trapping species are graftable onto the polymer via free radical initiated carbon-FRTS-carbon coupling bonds. Claim 15 defines a rheology-modifiable polymeric composition comprising a free-radical carbon-carbon crosslinkable polymer, a free-radical inducing species and a free-radical trapping species having at least two trapping sites. The free-radical trapping species suppresses carbon-carbon crosslinking of the polymer, and are graftable onto the polymer.

Claim 21 defines a rheology-modifiable polymeric composition comprising a free-radical carbon-carbon crosslinkable polymer (using shear, radiation or heat), and a free-radical trapping species having at least two trapping sites. The free-radical trapping species suppresses carbon-carbon crosslinking of the polymer, and are graftable onto the polymer. Claim 22 defines a rheology-modifiable polymeric composition comprising a free-radical carbon-carbon crosslinkable polymer, a free-radical inducing species and a free-radical trapping species. The free-radical trapping species are graftable onto the polymer via free radical initiated carbon-FRTS-carbon coupling bonds. Claim 23 defines a rheology-modifiable polymeric composition comprising a polymer which is a free-radical degradable polymer, or carbon-carbon crosslinkable polymer and pendant stable free-radical. Claim 24 defines a rheology-modifiable polymeric composition comprising a free-radical degradable polymer and pendant stable free-radical. Claim 25 defines a rheology-modifiable polymeric composition comprising a carbon-carbon crosslinkable polymer and pendant stable free-radical. Claim 26 defines a rheology-modifiable polymeric composition comprising a free-radical degradable polymer and a free-radical trapping species. The free-radical trapping species are graftable onto the polymer via free radical initiated carbon-FRTS-carbon coupling bonds. Claim 27 defines a rheology-modifiable polymeric composition comprising a free-radical carbon-carbon crosslinkable polymer and a free-radical trapping species. The free-radical trapping species are graftable onto the polymer via free radical initiated carbon-FRTS-carbon coupling bonds. Claim 28 defines a process for preparing a rheology-modified polymer by admixing a free-radical degradable polymer, free-radical inducing species and a free-radical trapping species. The free-radical trapping species suppresses degradation of the polymer, and are graftable onto the polymer. Secondly grafting the free-radical trapping species onto the polymer. Claim 29 defines a process for preparing a rheology-modified polymer by admixing a free-radical degradable polymer and free-radical trapping species having at least two trapping sites. The free-radical trapping species suppresses degradation of the polymer, and are graftable onto the polymer. Secondly admixing a free-radical inducing species and thirdly grafting the free-radical trapping species onto the polymer. Claim 30 defines a process for preparing a rheology-modified polymer by admixing a free-radical carbon-carbon crosslinkable polymer, free-radical inducing species and a free-radical trapping species. The free-radical trapping species suppresses carbon-carbon crosslinking of the polymer, and are graftable onto the polymer. Secondly grafting the free-radical trapping species onto the polymer.

Claim 31 defines a process for preparing a rheology-modified polymer by admixing a free-radical carbon-carbon crosslinkable polymer and free-radical trapping species having at least two trapping sites. The free-radical trapping species suppresses carbon-carbon crosslinking of the polymer, and are graftable onto the polymer. Secondly admixing a free-radical inducing species and thirdly grafting the free-radical trapping species onto the polymer. Claim 32 defines an article of manufacture prepared from the process disclosed in claims 28-31. Claim 33 defines an article of manufacture prepared from the process disclosed in claims 28-31 selected from e.g. wire-cable applications. Claim 34 defines a foam comprising a rheology-modified propylene copolymer characterised by a melt flow rate between 0.8-8 g/10 min. and a melt strength of at least 5 cN. Claim 35 defines the foam of claim 34 with a density of 800 kg/m<sup>3</sup> or less.

Therefore the different inventions lead to different results. Consequently, the present set of claims breaks up in nineteen inventions as follows:

Claims 1-12 : A rheology-modifiable polymeric composition comprising a free-radical degradable polymer, a free-radical inducing species and a free-radical trapping species having at least two trapping sites. The free-radical trapping species suppresses degradation of the polymer, and are graftable onto the polymer.

Claim 13 : A rheology-modifiable polymeric composition comprising a free-radical degradable polymer (using shear, radiation or heat), and a free-radical trapping species having at least two trapping sites. The free-radical trapping species suppresses degradation of the polymer, and are graftable onto the polymer.

Claim 14 : A rheology-modifiable polymeric composition comprising a free-radical degradable polymer, a free-radical inducing species and a free-radical trapping species. The free-radical trapping species are graftable onto the polymer via free radical initiated carbon-FRTS-carbon coupling bonds.

Claims 15-20 : A rheology-modifiable polymeric composition comprising a free-radical carbon-carbon crosslinkable polymer, a free-radical inducing species and a free-radical trapping species having at least two trapping sites. The free-radical trapping species suppresses carbon-carbon crosslinking of the polymer, and are graftable onto the polymer.

Claim 21 : A rheology-modifiable polymeric composition comprising a free-radical carbon-carbon crosslinkable polymer (using shear, radiation or heat), and a free-radical trapping species having at least two trapping sites. The free-radical trapping species suppresses carbon-carbon crosslinking of the polymer, and are graftable onto the polymer.

Claim 22 : A rheology-modifiable polymeric composition comprising a free-radical carbon-carbon crosslinkable polymer, a free-radical inducing species and a free-radical trapping species. The free-radical trapping species are graftable onto the polymer via free radical initiated carbon-FRTS-carbon coupling bonds.

Claim 23 : A rheology-modifiable polymeric composition comprising a polymer which is a free-radical degradable polymer, or carbon-carbon crosslinkable polymer and pendant stable free-radical.

Claim 24 : A rheology-modifiable polymeric composition comprising a free-radical degradable polymer and pendant stable free-radical.

Claim 25 : A rheology-modifiable polymeric composition comprising a carbon-carbon crosslinkable polymer and pendant stable free-radical.

Claim 26 : A rheology-modifiable polymeric composition comprising a free-radical degradable polymer and a free-radical trapping species. The free-radical trapping species are graftable onto the polymer via free radical initiated carbon-FRTS-carbon coupling bonds.

Claim 27 : A rheology-modifiable polymeric composition comprising a free-radical carbon-carbon crosslinkable polymer and a free-radical trapping species. The free-radical trapping species are graftable onto the polymer via free radical initiated carbon-FRTS-carbon coupling bonds.

Claim 28 : A process for preparing a rheology-modified polymer by admixing a free-radical degradable polymer, free-radical inducing species and a free-radical trapping species. The free-radical trapping species suppresses degradation of the polymer, and are graftable onto the polymer. Secondly grafting the free-radical trapping species onto the polymer.



Claim 29 : A process for preparing a rheology-modified polymer by admixing a free-radical degradable polymer and free-radical trapping species having at least two trapping sites. The free-radical trapping species suppresses degradation of the polymer, and are graftable onto the polymer. Secondly admixing a free-radical inducing species and thirdly grafting the free-radical trapping species onto the polymer.

Claim 30 : A process for preparing a rheology-modified polymer by admixing a free-radical carbon-carbon crosslinkable polymer, free-radical inducing species and a free-radical trapping species. The free-radical trapping species suppresses carbon-carbon crosslinking of the polymer, and are graftable onto the polymer. Secondly grafting the free-radical trapping species onto the polymer

Claim 31 : A process for preparing a rheology-modified polymer by admixing a free-radical carbon-carbon crosslinkable polymer and free-radical trapping species having at least two trapping sites. The free-radical trapping species suppresses carbon-carbon crosslinking of the polymer, and are graftable onto the polymer. Secondly admixing a free-radical inducing species and thirdly grafting the free-radical trapping species onto the polymer.

Claim 32 : An article of manufacture prepared from the process disclosed in claims 28-31.

Claim 33 : An article of manufacture prepared from the process disclosed in claims 28-31 selected from e.g. wire-cable applications.

Claim 34 : A foam comprising a rheology-modified propylene copolymer characterised by a melt flow rate between 0.8-8 g/10 min. and a melt strength of at least 5 cN.

Claim 35 : A foam comprising a rheology-modified propylene copolymer characterised by a melt flow rate between 0.8-8 g/10 min., a melt strength of at least 5 cN, and a density of 800 kg/m<sup>3</sup> or less.

There are nineteen independent claims each one containing especial technical feature not linked by a common concept. Therefore, nineteen different inventions can be identified. However, the examiner has grouped said nineteen inventions in only eight for the benefit of the applicant according to the following :

Claims 1-12,13,28,29,32,33 : A rheology-modifiable polymeric composition comprising a free-radical degradable polymer, a free-radical inducing species and a free-radical trapping species having at least two trapping sites. The free-radical trapping species suppresses degradation of the polymer, and are graftable onto the polymer. Article and process preparing said rheology-modified polymeric composition.

Claim 14 : A rheology-modifiable polymeric composition comprising a free-radical degradable polymer, a free-radical inducing species and a free-radical trapping species. The free-radical trapping species are graftable onto the polymer via free radical initiated carbon-FRTS-carbon coupling bonds.

Claims 15-20,21,30,31,32,33 : A rheology-modifiable polymeric composition comprising a free-radical carbon-carbon crosslinkable polymer, a free-radical inducing species and a free-radical trapping species having at least two trapping sites. The free-radical trapping species suppresses carbon-carbon crosslinking of the polymer, and are graftable onto the polymer. Article and process preparing said rheology-modified polymeric composition.

Claim 22 : A rheology-modifiable polymeric composition comprising a free-radical carbon-carbon crosslinkable polymer, a free-radical inducing species and a free-radical trapping species. The free-radical trapping species are graftable onto the polymer via free radical initiated carbon-FRTS-carbon coupling bonds.

Claims 23-25 : A rheology-modifiable polymeric composition comprising a polymer which is a free-radical degradable polymer, or carbon-carbon crosslinkable polymer and pendant stable free-radical.

Claim 26 : A rheology-modifiable polymeric composition comprising a free-radical degradable polymer and a free-radical trapping species. The free-radical trapping species are graftable onto the polymer via free radical initiated carbon-FRTS-carbon coupling bonds.

Claim 27 : A rheology-modifiable polymeric composition comprising a free-radical carbon-carbon crosslinkable polymer and a free-radical trapping species. The free-radical trapping species are graftable onto the polymer via free radical initiated carbon-FRTS-carbon coupling bonds.

Claims 34,35 : A foam comprising a rheology-modified propylene copolymer characterised by a melt flow rate between 0.8-8 g/10 min., a melt strength of at least 5 cN, and a density of 800 kg/m<sup>3</sup> or less.

**Re Item V**

**Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**  
**Reference is made to the following documents:**

D1 : EP1264857

D2 : WO02092561

**Novelty (Art. 33 (2) PCT)**

1. The document D1 discloses a curable polymeric composition comprising a free radical polymer and free radical trapping species. The composition is used in foam applications. The subject matter of claims 1-13,28,29,32 and 33 over D1 is considered to be not novel (Art. 33(2) PCT).

2. The document D2 discloses an organic peroxide heat stabiliser polymeric composition comprising a polypropylene polymer, a free radical polymer and free radical trapping species. The free radical polymer and free radical trapping species are identical to the one used in the present application. The subject matter of claims 1-13,28,29,32 and 33 over D2 is considered to be not novel (Art. 33(2) PCT).

**Inventive step (Art. 33(3) PCT)**

All the technical features of the present claims are described in document D1. Therefore the claims 1-12,13,28,29,32, and 33 do not involve an inventive step (Art. 33(3) PCT).

**Re Item VII**

**Certain defects in the international application**

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in document D1 is not mentioned in the description, nor is this document identified therein.

The specification for an international application should be capable of being understood without reference to any other document (cf PCT Guidelines Ch. II 4.17). The expression "hereby incorporated by reference" found in the description are therefore not according to the PCT requirements.

**Re Item VIII**

**Certain observations on the international application**

**Clarity (Art. 6 PCT)**

1. The relative term "substantially" used in the claims of the present application has no well-recognised meaning and leaves the reader in doubt as to the meaning of the technical feature to which it refers, thereby rendering the definition of the subject-matter of said claim unclear (Article 6 PCT).
2. The claims 2 and 3 do not meet the requirements of Article 6 PCT in that the matter for which protection is sought is not clearly defined. The claims attempt to define the subject-matter in terms of the result to be achieved, which merely amounts to a statement of the underlying problem, without providing the technical features necessary for achieving this result.
3. The claims of the present application are not supported by the description as required by Article 6 PCT. This inconsistency between the claims and the description leads to doubt concerning the matter for which protection is sought, thereby rendering the claims unclear.